

TECHNICAL SUPPORT DOCUMENT

for

**REVISIONS TO TITLE 35 PART 223: CONTROL OF
VOLATILE ORGANIC MATERIAL EMISSIONS**

from

CONSUMER AND COMMERCIAL PRODUCTS

AQPSTR 11-03

July 2011

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 NORTH GRAND AVENUE EAST
P.O. BOX 19276
SPRINGFIELD, ILLINOIS 62794-9276**

Table of Contents

List of Acronyms 3

Tables 4

Executive Summary 5

1.0 Introduction..... 7

2.0 Description of Sources and Emissions..... 9

3.0 Emissions in Illinois from Affected Product Categories 11

4.0 Technical Feasibility of Controls..... 13

5.0 Economic Reasonableness 15

6.0 Reduction of VOM Emissions in Illinois..... 18

7.0 Affected Sources and Compliance Measures 19

References..... 20

List of Acronyms

CAA	Clean Air Act
CARB	California Air Resources Board
CO	Carbon Monoxide
IAC	Illinois Administrative Code
Illinois EPA	Illinois Environmental Protection Agency
LADCO	Lake Michigan Air Directors Consortium
MRPO	Midwest Regional Planning Organization
NAA	Nonattainment area
NAAQS	National Ambient Air Quality Standard
NO _x	Oxides of Nitrogen
OTC	Ozone Transport Commission
SIP	State Implementation Plan
TPD	Tons per Day
VOM	Volatile Organic Material

Tables

Table 1	Annual VOM Emissions Due to Consumer and Commercial Products in Illinois
Table 2	Annual VOM Emissions from Affected Product Categories in Illinois
Table 3	Estimated Total Costs to Businesses Annually
Table 4	Estimated Per-Unit Cost Increases from Proposed Limits
Table 5	Estimated VOM Emission Reductions for Consumer Products

Executive Summary

In 2007, Illinois EPA proposed amendments to Title 35 of the Illinois Administrative Code (“IAC”) to add Part 223, “Standards and Limitations for Organic Material Emissions for Area Sources”. 35 IAC Part 223 set limits for the volatile organic material (“VOM”) content of various consumer products that were consistent with limits set for these product categories in California and the states of the Ozone Transport Commission (“OTC”). The limits proposed were consistent with those in the 2006 OTC Model Rule for Consumer Products that were in turn based on the consumer product VOM limits in the California’s Midterm Measures II rules and their 2004 amendments to those rules. While the majority of the limits proposed were adopted by the Illinois Pollution Control Board (“Board”), and were effective as of July 1, 2009, a number of categories were excluded by the Board due to a lack of technical support for those limits. The categories excluded at that time were those that were proposed by California in its 2004 Amendments and incorporated into the 2006 OTC Model Rule. In this rulemaking, Illinois EPA is proposing amendments that would include these limits in Part 223 as previously proposed, excepting the previously proposed limits for toilet/urinal care products and solid/gel room air fresheners. The Illinois EPA, in this document and referenced documents herein, has provided detailed technical support for the additional consumer product categories and the associated VOM limits for those categories in the proposed amendments.

The proposed limits would apply to 12 additional consumer product categories that include: adhesive removers, contact adhesives, non-aerosol antistatic products, electrical cleaners, electronic cleaners, engine degreasers, fabric refreshers, footwear or leather care products, graffiti removers, hair styling products, shaving gels, and wood cleaners.

Illinois EPA has drafted this Technical Support Document in support of the proposed amendments, and has found the proposed amendments to be both technically feasible and economically reasonable. A significant portion of the data and support for the proposed amendments has been taken from the detailed research done by the California Air Resources Board (“CARB”) in support of its 2004 amendments. It is likely that a good deal of the research conducted prior to the adoption of these limits in the OTC states and California may represent an overestimate of the cost of the amendments to both manufacturers and consumers in Illinois, as

well as an overestimate of emission reductions achieved by the proposed amendments. This is because a significant portion of the costs of reformulation and repackaging have already been incurred by affected manufacturers, and because it is also likely that a significant portion of the affected products being sold in Illinois are already compliant with the proposed limits.

1.0 Introduction

The precursors to the formation of ozone include volatile organic materials (“VOM”), oxides of nitrogen (“NO_x”) and carbon monoxide (“CO”). Ozone formation is most active during the summer months because the reactions are dependent on direct sunlight and high ambient temperatures. In humans, ozone is an irritant to the respiratory system and may damage lung and other tissues. This damage can lead to impaired breathing and reduced immunity to disease for people in good health. The effects may be more severe for young children, the elderly, and people with preexisting respiratory diseases such as asthma, bronchitis, and emphysema. Ozone is a powerful oxidant and, as such, reacts readily with a wide range of substances. Ozone oxidation can also damage plant tissue, reducing the yield of some crops, and damage certain other materials such as rubber.

To protect the public health of the citizens of Illinois and in an effort to maintain the 8 hour ozone NAAQS as required by Section 181(a) of the Clean Air Act, the Illinois Environmental Protection Agency (“Illinois EPA”) is proposing to further reduce VOM emissions from consumer and commercial products.

Consumer and commercial products are currently regulated in Illinois by Title 35 Part 223 of the Illinois Administrative Code. These state limits, mirroring a 2001 Ozone Transport Commission (“OTC”) model rule, apply to 48 products in this category, and became effective July 1, 2009. During public hearings for the previous rulemaking a number of proposed limits for additional product categories were removed by the Board from the Part 223 rule proposed by the Illinois EPA. Illinois EPA is proposing that these limits that mirror the 2006 OTC model rule be included in Part 223 to further reduce VOM emissions from these product categories. Further reductions in the aforementioned categories will be beneficial to the environment and are considered to be both economically reasonable and technologically feasible. Adoption of the proposed amendments would also make consumer products regulations more consistent with other regions that have adopted similar rules.

In evaluating the potential reductions of VOM emissions from affected consumer and commercial products, Illinois EPA has relied mainly on the findings of the California Air

Resources Board (“CARB”) from the research that body conducted in support of its 2004 amendments to their consumer products rules. CARB is part of the California Environmental Protection Agency.

The Ozone Transport Commission (“OTC”), as well as several other states and regions, have adopted these same rules, and in most cases the effective date was in 2009. The OTC is comprised of the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia and the District of Columbia. The Midwestern states of Indiana, Michigan, and Ohio have also adopted these rules for consumer products. The proposed limits are currently effective for the affected consumer products that are available to approximately 45% of the population of the United States.

Emissions data for consumer products is generally estimated on a per capita basis, based on the average usage of a particular product by a person in a given population. Illinois EPA has projected the potential reductions and the associated cost of additional control through these measures by using the research conducted by CARB and adjusting this data to reflect the difference in population between California and Illinois. Because this research was conducted prior to the adoption of these rules in California and the subsequent adoption in the other aforementioned regions, Illinois EPA believes that estimates for emission reductions and the cost associated with the reductions may be over estimates in some cases.

It is the position of the Illinois EPA that further regulation of these source categories is an integral part of its state implementation plan (“SIP”) for maintaining the NAAQS in Illinois, and that the proposed amendments are both technically feasible and economically reasonable for consumer products in Illinois.

2.0 Description of Sources and Emissions

As defined by the USEPA in federal rules, a consumer product is any household or institutional product (including paints, coatings, and solvents), or substance, or article (including any container or packaging) held by any person, the use, consumption, storage, disposal, destruction, or decomposition of which may result in the release of VOC (40 CFR § 59.202). Consumer and commercial products are chemically formulated products used by household and institutional consumers including, but not limited to, detergents; cleaning compounds; polishes; floor finishes; cosmetics; personal care products; home, lawn and garden products; disinfectants; sanitizers; aerosol paints; and automotive specialty products; but does not include other paint products, furniture coatings, or architectural coatings. Consumer and commercial products also includes aerosol adhesives, including aerosol adhesives used for consumer, industrial, and commercial uses.

Consumer and commercial products are sold to retail customers for personal, household, or automotive use, along with products marketed by wholesale distributors for use in commercial or industrial settings such as beauty shops, schools, and hospitals. This source category description includes hundreds of products sold to individuals such as personal care products, household products, automotive aftermarket products, adhesives and sealants, insecticides, coatings and a range of other miscellaneous products.

In Illinois, consumer and commercial product emissions account for approximately 9.98% of the total anthropogenic VOM emissions annually. Consumer and commercial products account for approximately 9.80% of total anthropogenic VOM emissions in the Metro-East ozone nonattainment area (NAA) and approximately 13.56% of total anthropogenic VOM emissions in the Chicago NAA annually.

The proposed amendments to 35 IAC Part 223 include limits in percent VOM by weight for adhesive removers, contact adhesives, non-aerosol antistatic products, electrical cleaners, electronic cleaners, engine degreasers, fabric refreshers, footwear or leather care products, graffiti removers, hair styling products, shaving gels, and wood cleaners. A more detailed

description of the product categories can be found in Chapter VI of CARB's Initial Statement of Reasons for its 2004 amendments ("2004 ISOR")¹.

3.0 Emissions in Illinois from Affected Product Categories

Evaporation of solvents contained in the affected consumer products causes the release of VOM in to the atmosphere. VOM emissions from consumer products are generally estimated on the basis of VOM content of the products, the average use of these products by people in a given region, and the population in that region. Table 1 provides the Illinois EPA’s estimated annual VOM emissions for 2008 from all consumer and commercial products during the ozone season and for the entire year; the total anthropogenic emissions of VOM in each area of the state along with the state total for each period; the percentage of the total anthropogenic VOM emissions in each area; and the population of each of these areas. The emissions data is estimated from pound per year per capita data and calculated using population estimates.

Table 1 Annual VOM Emissions Due to Consumer and Commercial Products in Illinois²

Area and Approximate Population	VOM – Consumer and Commercial Products (TPD)	Total Anthropogenic VOM (TPD)	% of Total Anthropogenic VOM
Attainment Area Pop. 3,715,059	41.01	652.49	6.28 %
Chicago NAA Pop. 8,542,457	91.60	675.14	13.56%
Metro–East St. Louis NAA Pop. 585,438	6.31	64.39	9.80%
Statewide Total Pop. 12,842,954	138.92	1392.02	9.98%

Illinois EPA has estimated emissions just for the affected categories by using the research conducted by CARB in its 2004 ISOR¹ and adjusting it for the population of Illinois. Table 2 lists the affected product categories and the estimated 2008 annual emissions associated with them statewide.

Table 2 Annual VOM Emissions from Affected Product Categories in Illinois

Product Category	Product Form	Estimated Emissions (TPD)
<u>Adhesive Removers:</u>		
Gasket or Thread Locking Adhesive Removers	All	0.011
General Purpose Adhesive Remover	All	0.113
Specialty Adhesive Remover	All	0.171
Floor or Wall Covering Adhesive Remover	All	0.247
Anti-Static Product	Aerosol	0.102
	Non-aerosol	0.000
<u>Contact Adhesive:</u>		
Contact Adhesive-General Purpose	All	0.026
Contact Adhesive-Special Purpose	All	0.028
Electrical Cleaner	All	0.122
Electronic Cleaner	All	0.089
Fabric Refresher	Aerosol	0.157
	Non-Aerosol	0.247
Footwear or Leather Care Product	Aerosol	0.019
	Solid	0.065
	All Other Forms	0.035
Graffiti Remover	Aerosol	0.032
	Non-aerosol	0.041
Hair Styling Product	Aerosol*, Pump Spray	0.174
	All Other Forms	0.070
Shaving Gel	All	0.382
Wood Cleaner	Aerosol	0.020
	Non-aerosol	0.084
Total		2.233

4.0 Technical Feasibility of Controls

The most effective approaches for achieving reductions in this source category are reformulating products currently employing VOM solvents and replacing them with water based formulations or formulations employing acetone or other exempt solvents. Other measures for reductions in this category include increasing the solids content of products, formulating non-VOM propellants for products, or changing the valves, containers, or delivery systems of the products to reduce VOM content.

Illinois EPA believes that the proposed limits for the affected categories to be technically feasible because compliant products in all categories are widely available in the OTC states, many Midwestern states, and in California. Indeed, a significant portion of the products in the affected categories that are available in Illinois are already compliant with the proposed limits. This is due to national and regional manufacturers of these products making a one-time change to the products in order to be compliant with the most stringent rules in the country and selling the same product nationally.

The OTC consists of the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and the District of Columbia. The first OTC Model Rule for Consumer Products became effective for these states and the District of Columbia on January 1, 2005. The 2006 OTC Model Rule based on CARB's 2004 amendments has been effective in these states and the District of Columbia since July 1, 2009. Additionally the same rules are effective for consumer products in the MRPO states of Indiana, Michigan, and Ohio. The proposed limits are currently effective for the affected consumer products that are available to approximately 45% of the population of the United States.

Due to the nature of this source category, it is considered essential that regulations be as uniform as possible in a given region, and between regions with similar rules, in order to affect the smallest possible economic impact and the least amount of disruption to manufacturing

processes. Illinois EPA has proposed limits for the affected categories that mirror those in California, the OTC states, and the Midwestern states that these rules are effective in.

The current OTC consumer products rules are based upon the CARB rules for control of VOM in the source category and the associated background data for the CARB rules. The technical basis for the proposed VOC content limits lies within the framework that the CARB developed for its consumer products rules. Significant technical documentation was developed as part of the CARB process. Recognizing that the proposed emission limits are already in place in California, the OTC states and the District of Columbia, as well as in several Midwestern states, the Illinois EPA believes that the proposed limits clearly are technologically feasible. Furthermore, the method by which VOM reductions are achieved in this source category is most commonly a change in the formulation or delivery system of the product available to consumers. Since many national manufacturers of products subject to this rule have already made modifications to their products in order to comply with these limits in the aforementioned states, it is reasonable to expect that similar reformulations could be made, or have already been made, for products for sale in Illinois.

5.0 Economic Reasonableness

Illinois EPA has relied upon the technical support documents prepared by CARB in its 2004 rulemaking for consumer and commercial products¹ to estimate the costs and cost-effectiveness of the proposed emission limits on businesses and consumers in Illinois. Table 3 lists the estimated costs of the proposed regulation to affected businesses, including annualized non-recurring cost and annual recurring cost, by affected product categories. It should be noted that these cost estimates are based upon surveys and research conducted by California in 2001 before the proposed limits were effective in the aforementioned regions. This would indicate that a significant portion of these costs may have already been realized in Illinois.

Table 3 Estimated Total Costs to Businesses Annually

Category	For a Typical Business in the Product Category		
	Low Cost	High Cost	Mid Cost
Contact Adhesive			
General Purpose	\$1,669	\$1,757	\$1,713
Special Purpose	\$487	\$2,498	\$1,492
Adhesive Remover			
Gasket or Thread Locking	\$3,942	\$16,483	\$10,212
Floor or Wall Covering	\$4,085	\$26,622	\$15,353
General Purpose	\$4,192	\$21,134	\$12,663
Specialty	\$4,204	\$31,890	\$18,047
Anti-static Product, Non-aerosol	NA	NA	NA
Electrical Cleaner	\$8,191	\$10,449	\$9,319
Electronic Cleaner	\$7,321	\$27,953	\$17,637
Fabric Refresher			
Aerosol	\$5,743	\$16,708	\$11,226
Non-aerosol	\$5,743	\$8,354	\$7,049
Footwear or Leather Care Products			
Aerosol	\$3,542	\$9,329	\$6,435
Solid	\$3,048	\$7,434	\$5,241
Other Forms	\$6,080	\$16,030	\$11,055
Graffiti Remover			
Aerosol	\$4,783	\$18,160	\$11,472
Non-aerosol	\$3,236	\$10,297	\$6,767
Hair Styling Products			
Aerosol and Pump Sprays	\$3,225	\$7,883	\$5,554
All Other Forms	\$6,730	\$16,452	\$11,591
Shaving Gel	\$7,740	\$31,819	\$19,779
Wood Cleaner			
Aerosol	\$2,234	\$6,092	\$4,163
Non-aerosol	\$1,624	\$4,283	\$2,953

Table 4 lists estimated per-unit cost increase for the product categories based on the annualized non-recurring costs and annual recurring costs in Table 3. It should again be noted that a significant amount of increased costs to consumers in Illinois may have already taken place due to the proposed limits being effective in the aforementioned regions that have adopted similar rules.

Table 4 Estimated Per-Unit Cost Increases from Proposed Limits

Category	Typical Unit Weight Ounces	Annualized Low Cost/Unit	Annualized High Cost/Unit	Annual Recurring Low Cost/Unit	Annual Recurring High Cost/Unit	Total Increase Low/Unit	Total Increase High/Unit	Total Increase Mid/Unit
		(A)	(B)	(C)	(D)	(E)=(A+C)	(F)=(B+D)	(G)=(E+F)/2
Contact Adhesive								
General Purpose	4.32	\$0.02	\$0.02	\$0.03	\$0.05	\$0.05	\$0.07	\$0.06
Special Purpose	13.84	\$0.00	\$0.01	\$0.00	\$0.00	\$0.00	\$0.01	\$0.01
Adhesive Remover								
Gasket or Thread Locking	18.00	\$0.07	\$0.30	\$0.77	\$0.77	\$0.84	\$1.07	\$0.95
Floor or Wall Covering	100.00	\$0.03	\$0.12	\$0.00	\$1.34	\$0.03	\$1.46	\$0.74
General Purpose	9.00	\$0.03	\$0.11	\$0.19	\$0.00	\$0.22	\$0.11	\$0.17
Specialty	18.00	\$0.02	\$0.07	\$0.35	\$0.00	\$0.37	\$0.07	\$0.22
Anti-static Product, Non-aerosol	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Electrical Cleaner	12.00	\$0.03	\$0.04	\$0.00	\$0.00	\$0.03	\$0.04	\$0.04
Electronic Cleaner	12.00	\$0.08	\$0.30	\$0.00	\$0.00	\$0.08	\$0.30	\$0.19
Fabric Refresher								
Aerosol	14.00	\$0.00	\$0.01	\$0.17	\$0.15	\$0.17	\$0.16	\$0.17
Non-aerosol	32.00	\$0.03	\$0.05	\$0.00	\$0.00	\$0.03	\$0.05	\$0.04
Footwear or Leather Care Products								
Aerosol	4.25	\$0.02	\$0.06	\$0.01	\$0.01	\$0.03	\$0.07	\$0.05
Solid	1.13	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Other Forms	3.29	\$0.02	\$0.06	\$0.00	\$0.00	.02	\$0.06	\$0.04
Graffiti Remover								
Aerosol	17.00	\$0.10	\$0.41	\$0.05	\$0.05	\$0.15	\$0.46	\$0.31
Non-aerosol	128.75	\$0.64	\$2.03	\$0.00	\$0.00	\$0.64	\$2.03	\$1.33
Hair Styling Products								
Aerosol and Pump Sprays	14.50	\$0.03	\$0.07	\$0.00	\$0.00	\$0.03	\$0.07	\$0.05
All Other Forms	12.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Shaving Gel	7.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Wood Cleaner								
Aerosol	12.00	\$0.01	\$0.02	\$0.00	\$0.00	\$0.01	\$0.02	\$0.01
Non-aerosol	135.98	\$0.11	\$0.28	\$0.00	\$0.00	\$0.11	\$0.28	\$0.20

Illinois EPA considers the annualized costs to businesses and the per unit cost increases to be reasonable for the control of VOM from these consumer product categories. In its 2004 ISOR, CARB estimated that the proposed limits would cost between \$4,020 and \$4,680 per ton of VOM reduced¹. Illinois EPA considers this to be an overestimate of the cost per ton of VOM reduced in Illinois from the proposed rules because a significant part of these costs has already been realized in Illinois and nationwide. Illinois EPA considers the proposed limits for the affected product categories to be a cost effective measure for the reduction of VOM emissions in Illinois.

6.0 Reduction of VOM Emissions in Illinois

Table 5 provides estimated reductions in VOM emissions from each affected product category. These estimates are derived from the detailed research conducted by CARB for their 2004 rulemaking and contained in the 2004 ISOR. Illinois EPA has estimated emissions reductions for each affected category by adjusting CARB data on a proportional basis for the population of Illinois. Illinois EPA acknowledges that these figures may represent overestimates of actual emission reductions in Illinois due to the penetration of compliant products in the state from manufacturers who market their products in states that have already adopted similar rules.

Table 5 Estimated VOM Emission Reductions for Consumer Products

Product Category	Product Form	Proposed VOM Limit % by Weight	Estimated Emissions Reduction (TPD)
<u>Adhesive Removers:</u>			
Gasket/Thread Locking Adhesive Removers	All	50	-0.004
General Purpose Adhesive Remover	All	5	0.234
Specialty Adhesive Remover	All	20	0.096
Floor or Wall Covering Adhesive Remover	All	70	0.051
Anti-Static Product	Aerosol	11	0.000
<u>Contact Adhesive:</u>			
Contact Adhesive-General Purpose	All	55	0.001
Contact Adhesive-Special Purpose	All	80	0.000
Electrical Cleaner	All	45	0.026
Electronic Cleaner	All	75	0.018
Fabric Refresher	Aerosol	15	0.082
	Non-Aerosol	6	0.082
Footware or Leather Care Product	Aerosol	75	0.003
	Solid	55	0.014
	All Other Forms	15	0.022
Graffiti Remover	Aerosol	50	0.005
	Non-aerosol	30	0.026
Hair Styling Product	Aerosol*, Pump Spray	6	0.150
	All Other Forms	2	0.060
Shaving Gel	All	7	0.046
Wood Cleaner	Aerosol	17	0.007
	Non-aerosol	4	0.086
Total			1.005

7.0 Affected Sources and Compliance Measures

The proposed regulation affects consumer and commercial products from particular source classification codes and anyone who sells, supplies, offers for sale, or manufactures any of the products in listed Table 1 in Illinois. Illinois EPA, in this rulemaking process has made efforts to conduct outreach to manufacturers of affected products in Illinois, as well as retail and consumer products organizations in order to provide information to potentially affected stakeholders.

The Illinois EPA concludes that these limits for VOM in consumer and commercial products are technologically feasible and economically reasonable. There are currently compliant products for sale in each affected product category. Indeed, many of the affected products sold in Illinois are already compliant with the proposed limits. These compliant products have been shown to be effective in their purpose, and have not significantly changed the usefulness of the product by reducing VOM content, or by using a substitute solvent in the product.

References

1. California Air Resources Board, *Initial Statement of Reasons for the Proposed Amendments to the California Aerosol Coating Products, Antiperspirants and Deodorants, and Consumer Products Regulations, Test Method 310, and Airborne Toxic Control Measure for Para-Dichlorobenzene Solid Air Fresheners and Toilet/Urinal Care Products*, May 7, 2004.
2. Illinois Environmental Protection Agency, *Illinois Ozone Emission Inventory for 2008*, August 2010.